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Indian Standard

METHODS OF MEASUREMENT ON RECEIVERS FOR TELEVISION BROADCAST TRANSMISSIONS

PART 6 SELECTIVITY AND RESPONSE TO UNDESIRED SIGNALS

(*First Revision*)

UDC 621·397·62 : 621·391·84

Indian Standard

METHODS OF MEASUREMENT ON RECEIVERS FOR TELEVISION BROADCAST TRANSMISSIONS

PART 6 SELECTIVITY AND RESPONSE TO UNDESIRED SIGNALS

(First Revision)

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Indian Standard
METHODS OF MEASUREMENT ON RECEIVERS FOR TELEVISION BROADCAST TRANSMISSIONS

PART 6 SELECTIVITY AND RESPONSE TO UNDESIRED SIGNALS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part 6)(First Revision) was adopted by the Indian Standards Institution on 6 December 1983, after the draft finalized by the Radio Communications Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The first version of IS : 4545 covered the methods of measurement for television broadcast receivers having monochrome vision reception. With the introduction of colour television receivers, this standard is now being revised to make it applicable to receivers designed, for both monochrome and colour vision reception and published in a number of parts to deal with various aspects of characteristics of television receivers.

0.3 This standard (Part 6) covers methods of measurement for selectivity and response to undesired signals of television receivers. Other parts in this series are:

Part 1 General considerations

Part 2 Tuning properties and general measurements

Part 3 Geometrical properties of the picture

Part 4 Synochronizing quality

Part 5 Sensitivity

Part 7 Fidelity

Part 8 Compatibility with audio visual recording equipment

Part 9 Electrical and acoustic measurements at audio frequency

0.4 This standard (Part 6) is largely based on IEC Publication 107-1 (1977) Recommended methods of measurement on receivers for television broadcast transmissions: Part 1 General considerations electrical measurements other than those at audio frequencies, issued by the International Electrotechnical Commission.

0.5 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

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*Rules for rounding off numerical values (revised).

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1. SCOPE

1.1 This standard (Part 6) covers methods of measurements relating to selectivity and response to undesired signals namely:

a) Single signal selectivity,

b) Multiple signal selectivity,

c) Intermediate frequency interference ratio,

d) Image interference ratio,

e) Spurious responses,

f) Internally generated undesired signals,

g) Cross modulation,

h) Inter-modulation, and

j) Frequency doubling special test.

1.2 This standard (Part 6) shall be read in conjunction with IS : 4545 (Part 1)-1983*.

2. SINGLE SIGNAL SELECTIVITY

2.1 Definition — The single signal selectivity of a television receiver is represented by a characteristic showing either: (a) the relationship between the input signal level and the input signal frequency at constant amplification for constant output at the video detector, or (b) the relationship between output level at the video detector and input frequency for constant input signal level, depending upon the method of measurement. It

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*Methods of measurement on receivers for television broadcast transmissions: Part 1 General considerations (first revision).

gives a certain measure of the receiver's ability to reject undesired signals at nearby frequencies.

2.2 Method of Measurement — The measurement shall be carried out with the receiver tuned to each television channel for which it has been designed or at least to a representative number of channels in each television band for which operation is intended. A television signal in the channel to which the receiver is tuned, is applied to the receiver input terminals through a suitable matching network. The receiver controls are set so that standard output is obtained for both vision and sound for two different input signal levels. These two input signal levels are the lowest level for which the receiver can give standard video output voltage and the level of −50 dB (mW) or the maximum usable input signal level whichever is the higher.

Any AGC circuit is made inoperative and a fixed bias equal to the AGC bias corresponding to the two input level is determined and applied to the controlled circuits. The measurements below are carried out for each of these two setting of the receivers.

Instead of the television signal, a radio-frequency carrier 30 percent sine-wave amplitude modulated with a suitable audio-frequency tone, for example, 1kHz, is now applied to the receiver input terminals through a suitable matching network. The carrier signal generator is tuned to the vision carrier frequency. The input signal level is adjusted until the audio tone output obtained is 12 dB below the standard video output voltage as indicated by an oscilloscope connected to the video detector or equivalent circuit point. The input signal frequency is varied over a sufficiently wide range to cover at least the adjacent television channels.

The response is measured at a number of frequency settings of the carrier signal generator including the co-channel sound, co-channel chrominance sub-carrier and the vision, sound and chrominance sub-carrier frequencies of the adjacent channels, plus any other rejection points. At each of these frequencies, the input signal level is adjusted until an output voltage 12 dB below the standard video output voltage is obtained. The single selectivity is expressed by the ratio of the input signal level at these frequencies to the input signal level at the vision carrier frequency, both giving an output voltage of 12 dB below the standard video output voltage. If it is not possible to obtain an output voltage of 12 dB below standard output voltage at any frequency within the range under consideration, measurement may be carried out at a different level of output voltage, for example, to avoid overloading. In this case, the output level used for the measurements shall be given with the results.

Alternatively, a swept signal generator and logarithmic oscilloscope display may be used as the signal source and indicator. In this case, the input level is adjusted so that the maximum of the response corresponds to the standard video output voltage. Care shall be taken to ensure that the response is not distorted by the presence of time constants, dc restorers, clamps or similar devices in the associated receiver circuits. The signal generator sweep speed must be sufficiently slow to avoid the response of regions of high selectivity such as traps being distorted.

NOTE — This method of measurement may not be applied to receivers using multiplicative intermediate frequency demodulation or to receivers in which the AGC circuit cannot be rendered inoperative. Furthermore, the application of continuous wave or purely sinewave modulated signals may give rise to anomalous operation in some receivers. In these cases, the methods of measurement described in 2.1, 2.5 and 3 shall be applied.

2.3 Presentation of Results — The results of the measurements of each of the two settings of the receivers are represented as a function of frequency by a graph. The frequency is plotted on a linear scale as abscissa and respectively signal input ratio or the response relative to the vision carrier frequency expressed in decibels on a linear scale as ordinate. The 0 db level corresponds to the frequency of the vision carrier (see Fig. 1 A).

2.4 Alternative Method of Measurement — The measurement shall be carried out with the receiver tuned to each television channel for which it has been designed or at least to a representative number of channels in each television band for which operation is intended. A television signal in the channel to which the receiver is tuned is applied to the receiver input terminals through a suitable matching network.

The receiver controls are set so that standard output is obtained for both vision and sound for two different input signal levels. These two input signal levels are the lowest level for which the receiver can give standard video output voltage and the level of −50 dB (mW) or the maximum usable input signal level whichever is the higher. Measurements are carried out for each of these two input levels.

Two signal generators are then applied to the receiver by means of a suitable combining network. The first corresponds to the vision carrier frequency of the channel to which the receiver is tuned and is modulated by a picture signal giving rise to normal synchronizing and blanking levels but having a constant signal during the active line that results in zero carrier level. The second signal generator has a mean level relative to the first signal generator corresponding to 50 percent of white level. It is modulated 30 percent by a 1 000 Hz sine-wave and gated off during the synchronizing and blanking intervals. The second signal generator is tuned across the frequency range of interest, the level of the 1 000 Hz sine-wave signal being
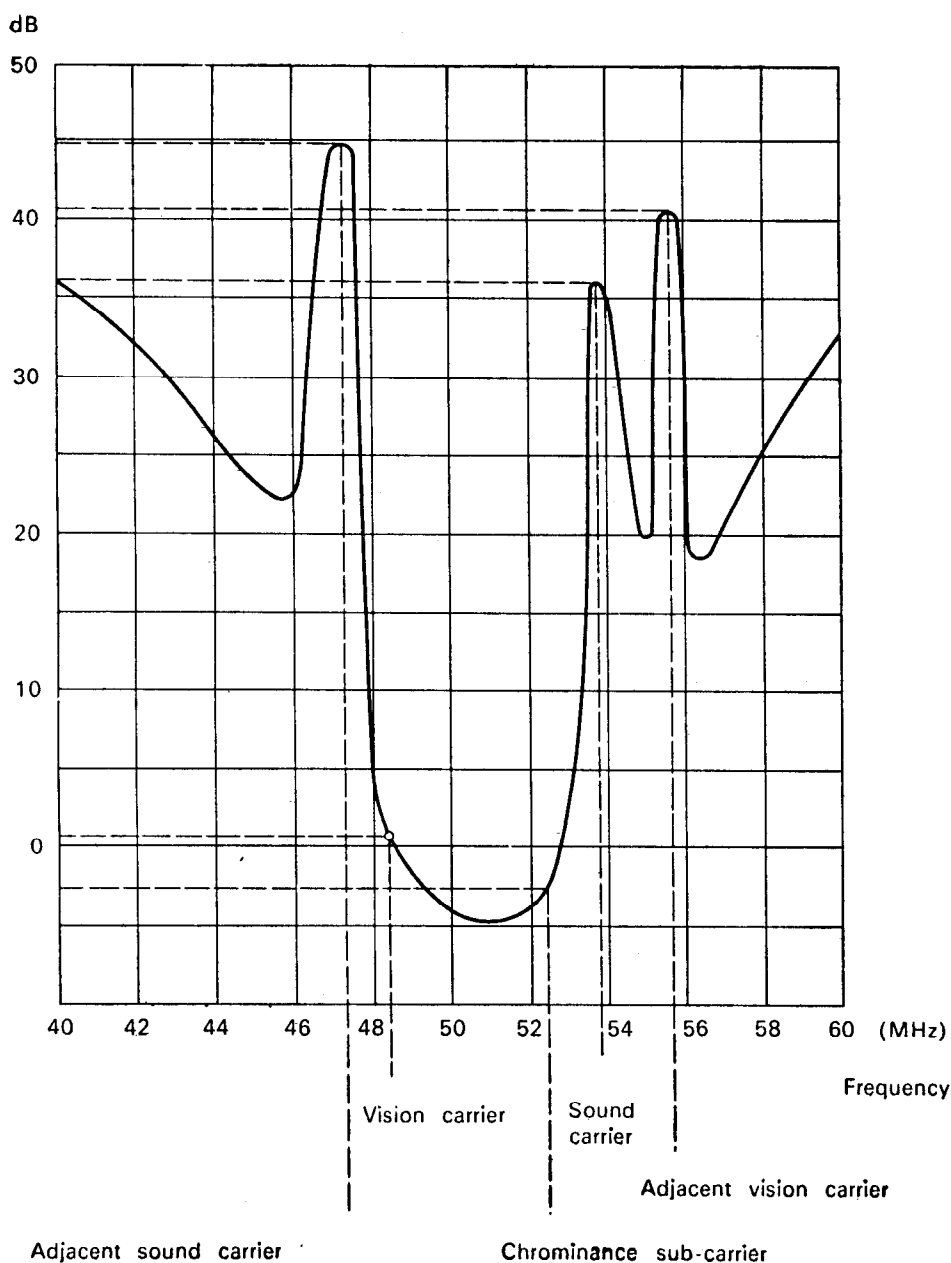
dB

FIG. 1A EXAMPLE OF A SINGLE SIGNAL SELECTIVITY CURVE

measured at appropriate frequencies.

NOTE — This method of measurement may be applicable to receivers using positive picture modulation.

2.5 Presentation of Results — The results of the measurements of each of the two settings of the receiver are represented as a function of frequency by a graph. The frequency is plotted on a linear scale as abscissae and respectively signal input ratio or the response relative to the vision carrier frequency expressed in dB on a linear scale as ordinate (*see* Fig. 1A).

3. MULTIPLE SIGNAL SELECTIVITY

3.1 Definition — The multiple signal selectivity of a television receiver is represented by a characteristic showing the input signal level of a given

frequency required to generate a beat of a given level at the video detector, when accompanying a television signal the picture content of which is at black level or white level. It provides a measure of the receiver's ability to reject signals at nearby frequencies.

A television signal in the channel to which the receiver is tuned, is applied to the receiver input terminals through a suitable combining network and a suitable matching network.

3.2 Method of Measurement — The measurements shall be carried out with the receiver tuned to each television channel for which it has been designed or at least to a representative number of channels in each band for which operation is intended.

A cw signal generator adjustable in frequency over a range extending to at least the two adjacent channels, is applied to the other input of the combining network. The receiver controls are set so that the standard output is obtained for both vision and sound for two different input signal levels. These two input signal levels are the lowest level for which the receiver can give standard video output voltage (that is, the gain limited sensitivity) and the level of −50 dB (mW) or the maximum usable input signal level. The following measurements are carried out for each of these two input levels. In some cases, it may not be possible to carry out a measurement at the input level corresponding to the gain limited sensitivity since noise may mask the signal, in which case the input level corresponding to the noise-limited sensitivity shall be used.

The cw signal tuned to the frequency of interest is applied to the receiver in addition to the television signal. The resulting beat is observed by an oscilloscope connected to the video detector output of equivalent point. The cw signal level is adjusted until a peak-to-peak output voltage of 12 dB below the standard video output voltage is obtained. The measurement is carried out with the cw signal set to the vision, chrominance and sound carrier frequencies of both adjacent channels and any other rejection points.

The response at the co-channel sound carrier frequency is measured by removing the sound signal from the television signal and tuning the cw signal generator to the sound carrier frequency, the beat being measured as above but care shall be taken to allow for the effect of any inter-carrier sound signal take-off or video intercarrier frequency trap.

These measurements are carried out with the television signal having the picture content corresponding to black level and again corresponding to white level. When carrying out tests with the picture content at white level, care shall be taken to avoid spurious effects due to overloading of subsequent video stages or the high tension supply to the picture tube. These effects may be avoided for instance, if there is a subsequent video contrast control available or in the case of the high tension supply, by removing the video drive to the picture tube.

The multiple signal selectivity is expressed by the ratio of the cw input signal level at the frequencies of interest to the vision carrier input signal level. If it is not possible to obtain an output voltage of 12 dB below the standard video output voltage for the beat at any frequency within the range under consideration, the measurements may be carried out at a different level of output voltage, for example, to avoid overloading of the receiver stages.

3.3 Presentation of Results — Four values may be tabulated for each frequency of measurement corresponding to the two input signal levels and the two levels of picture content.

Due allowance shall be made in the results for the measurements taking place at beat signal levels 12 dB below the standard video output voltage, thus adding 12 dB to the value of rejection at the various frequencies. Where measurements are carried out at a different beat level as described above, this is the value that shall be taken into consideration (see Fig. 1B).

4. INTERMEDIATE FREQUENCY INTERFERENCE RATIO

4.1 Definition — The intermediate frequency interference ratio of a television receiver represents the ability of the receiver to reject a signal in the intermediate frequency band.

4.2 Method of Measurement — The measurement is carried out by either the single signal selectivity measurement method or the multiple signal selectivity method. The measurement is repeated with the receiver tuned to each television channel for which it has been designed or at least to a representative number of channels in each television band for which operation is intended. For receivers with a balanced antenna input, the measurements are made with balanced and unbalanced input of the interfering signal.

The signal generator frequency is adjusted within the intermediate frequency band until a maximum intermediate frequency response is obtained and also to the vision carrier frequency of the channel to which the receiver is tuned. The ratio between the input signal levels required to give an output voltage 12 dB below the standard video output voltage at these two frequencies is the intermediate frequency interferenc ratio. If it is not possible to obtain an output voltage of 12 dB below the standard video output voltage when the intermediate frequency signal is applied, the intermediate frequency interference ratio may be determined at a lower output level. In this case, the output level used for the measurements shall be given with the results.

The results are presented in the same manner as those described in 2.5 and 3.3 respectively.

5. IMAGE INTERFERENCE RATIO

5.1 Definition — The image interference ratio of a television receiver represents the ability of the receiver to reject a signal at the image frequency.

5.2 Method of Measurement — The method of measurement and the presentation of results are carried out in exactly the same manner as that for the intermediate frequency interference ratio and is repeated with the receiver tuned to each channel for which it has been designed or at least to a representative number of channels in each television band for which operation is
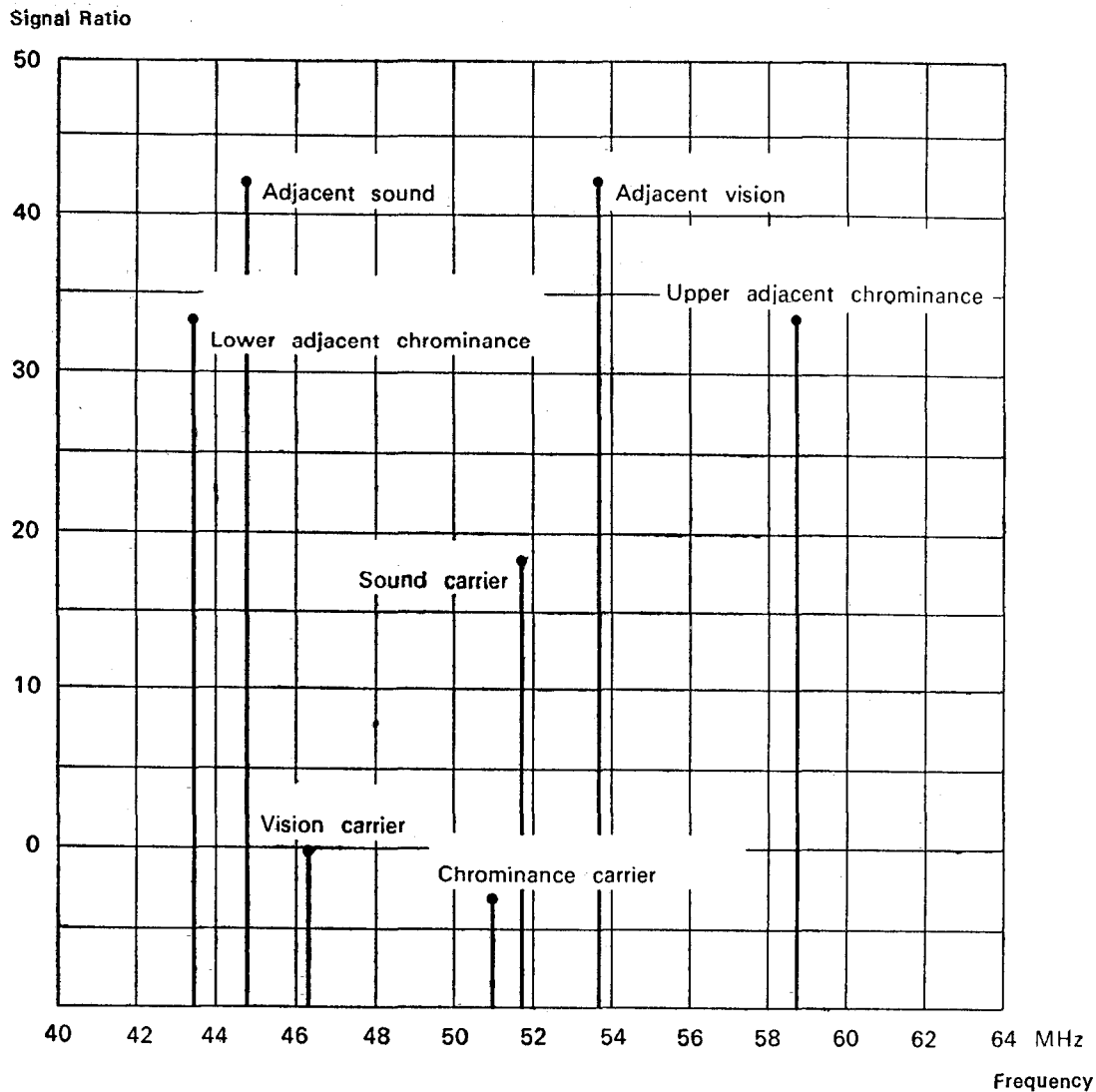
Signal Ratio

FIG. 1B EXAMPLE OF MULTIPLE SIGNAL SELECTIVITY (ONE SET OF MEASURING CONDITIONS)

intended. In this case, the signal generator frequency is adjusted within the image channel and the adjacent channel it of the image until a maximum for two or more significant image response are obtained.

6. SPURIOUS RESPONSES

6.1 Definition — Spurious responses may be caused if external signals or one of their internally generated harmonics mix with the receiver local oscillator frequency or one of it's harmonics or in combination with an internally generated spurious oscillation and thereby producing and interfering signal in the intermediate frequency passband or at the video detector. Such responses may also be caused by cross-modulation.

6.2 Method of Measurement — The procedures to be described shall be followed for two conditions corresponding to the lowest and highest

signal levels as mentioned in **36, 37** and **47** of Part 5 of this standard. These input signal levels shall be given with the results.

In addition to the television signal referred to above, an interfering carrier, sine-wave amplitude modulated 30 percent with a suitable audio-frequency tone, for example 1 kHz, is applied to the receiver input terminals through a suitable combining network. The level of the interfering signal is made as high as possible, bearing in mind the effects of cross-modulation, its value being stated and its frequency varied over a wide-range, which shall also be stated. This frequency range may extend upwards from 150 kHz and shall include the significant parts of the radio-frequency spectrum, bearing in mind possible local conditions. Special attention shall be paid to the LF, MF, HF, VHF and UHF broadcast bands, also those allocated for mobile, amateur and radio-telephone use. In some

cases the SHF bands used for radar and point-to-point communication may be important.

Care shall be taken that the television input signal and the interfering carrier are adequately free from harmonics. The picture screen is observed and every time an interference pattern is noticed, the interfering carrier level is reduced until the pattern remains just visible.

This level and the frequency range over which the pattern remains visible, is recorded for every spurious response encountered. The levels of the interfering carrier for which sound interference is just audible, are also recorded.

It is desirable to check the interference observed in each case with an unmodulated interfering carrier.

The measurements shall be carried out with the receiver tuned to each channel for which it has been designed or at least to a representative number of channels in each television band for which operation is intended.

6.3 Presentation of Results — The results and measurements are represented in a graph with the frequency plotted on a logarithmic scale as abciasse and the ratio between the interfering and desired signals expressed in dB on a linear scale as ordinates. The two levels mentioned in **6.2** and the channel to which the receiver is tuned shall be indicated. An example is shown in Fig. 2.
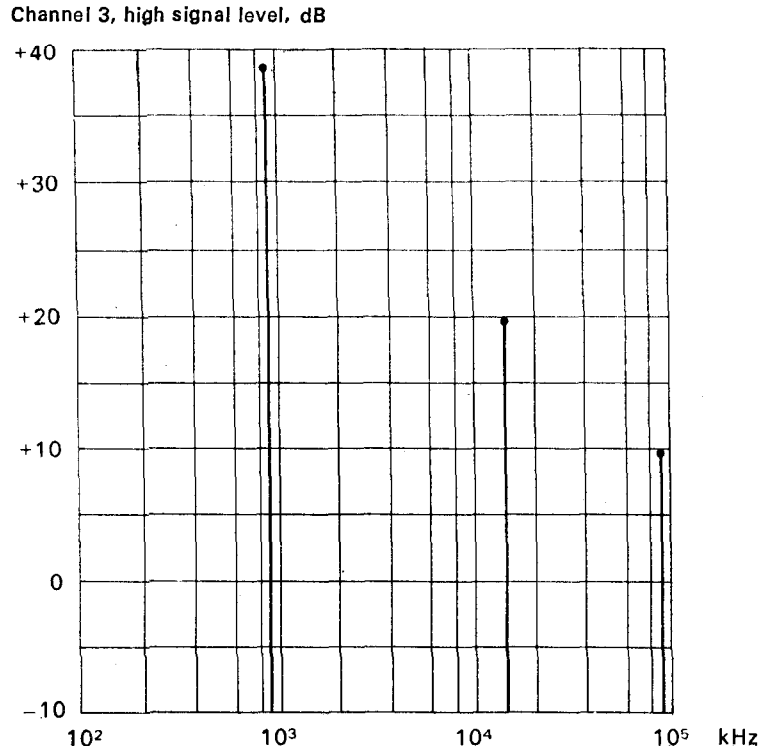
7. INTERNALLY GENERATED UNDESIRED SIGNALS

7.1 Definition — The following are the commonest sources of internally generated unwanted signals.

a) Harmonics of the vision and sound intermediate frequency signals that fall into the radio-frequency passband to which the receiver is tuned.

b) Harmonics of the desired input signal mixing with harmonics of the local oscillator producing signals that fall within the intermediate frequency passband of the receiver.

c) Harmonics of the carrier chrominance signal that fall within the intermediate frequency passband of the receiver or the radio-frequency passband to which the receiver is tuned.

d) Harmonics of the reference or regenerated chrominance sub-carrier that fall within the intermediate frequency passband of the receiver or the radio-frequency passband to which the receiver is tuned.

e) Video signal components appearing in the audio channel causing interference in the sound output.

f) Sound modulation appearing in the synchronizing circuits causing interference with synchronization.

g) Sound modulation and intercarrier beats appearing in the video amplifier causing

Channel 3, high signal level, dB

FIG. 2 EXAMPLE OF SPURIOUS RESPONSES

interference on the picture screen.

h) Deflection waveforms appearing in the audio amplifier causing interference in the sound output.

j) Deflection waveforms appearing in the video systems causing interference, in the picture.

k) Spurious self-oscillation having frequency components interfering with the radio-frequency, intermediate frequency, video frequency or audio-frequency signal.

7.2 Method of Measurement — A television signal is applied to the receiver input terminals, the picture modulation being a test pattern as described in **2.12** of IS : 4545 (Part 1) -1983* and sound modulation where applicable at 90 percent.

The performance is investigated with the receiver tuned and a television signal applied for each television channel for which it has been designed or at least to a representative number of channels in each television band for which operation is intended.

The observations are carried out with input signals corresponding to the lowest and the highest levels and a note is made where any interference pattern in the picture or equivalent interference in the sound output is observed. If the receiver is equipped with manual tuning, the tuning adjustment is varied to either side of optimum to determine whether the interference effect critically depends upon the receiver tuning.

8. CROSS-MODULATION

8.1 Definition — Cross-modulation occurs when two or more signals are applied to a television receiver and the modulation of an unwanted signal is transferred to the wanted signal over a range of input signal levels. This form of interference is distinct from those arising due to the receiver selectivity and intermodulation.

8.2 Method of Measurement — The measurement shall be carried out with the receiver tuned to each channel for which it has been designed or at least to a representative number of channels in each television band for which operation is intended. A television signal in the channel to which the receiver is tuned is applied to the receiver input terminals through a suitable combining network and a suitable matching network. A signal generator covering the required range of frequencies and 90 percent sinewave amplitude modulated with a suitable frequency tone, for example 1 kHz, is applied to the other input of the combining network. The receiver controls are set so that the standard output is obtained for both vision and sound for three different input signal levels. The first of these

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*Methods of measurement on receivers for television broadcast transmissions: Part 1 General considerations (*first revision*).

three input signal levels is the level corresponding to either the gain-limited sensitivity or the noise-limited sensitivity. The second is a level of —50 dB (mW) or the maximum usable input signal level and the third, the intermediate signal level.

The following measurements are carried out for each of these three input levels. The television signal to which the receiver is tuned has a 50 percent level grey pedestal as picture modulation. The signal generator is tuned to the frequency of interest and the level increased until an output voltage of the tone modulation at the picture tube electrodes is obtained, that is, unless another value has been specified 12 dB below the standard video output voltage.

If it is not possible to obtain an output voltage 12 dB below the standard video output voltage, measurements may be carried out at a different level of output voltage that shall be given with the results. Frequencies to which the tone modulated signal generator are set may depend upon local conditions but frequencies shall be avoided where the measurement process is affected by beats resulting from the receiver selectivity or spurious responses. Measurements shall be made with the signal generator set to suitable frequencies in the band to which the receiver is tuned and to frequencies in other bands used for television and VHF sound radio broadcasting and mobile communications transmissions in the area for which the receiver is intended.

8.3 Presentation of Results — Values for the level of interfering signal applied to the receiver to obtain cross-modulation products having a voltage 12 dB below the standard video output voltage are tabulated for all measurement frequencies and television signal input levels. Due allowance shall be made in the results when measurements are made at cross-modulation product levels other than 12 dB below the standard video output voltage.

9. INTERMODULATION

9.1 Definition — Intermodulation occurs when two unwanted signals are applied to a television receiver together with a wanted signal and modulation products between the two unwanted signals give rise to an interfering signal within the wanted channel. This form of interference is distinct from those arising due to the receiver selectivity and cross-modulation.

9.2 Method of Measurement — Measurements shall be carried out with the receiver tuned to each channel for which it has been designed or at least to a representative number of channels in each television band for which operation is intended. A television signal in the channel, to which the receiver is tuned, is supplied to the receiver input terminals through a suitable combining network and a suitable matching

network. Two cw signal generators covering the required range of frequencies are connected to the other two inputs of the combining network.

The receiver controls are set so that the standard output is obtained for both vision and sound for three different input signal levels. The first of these three input a signal level is the level corresponding to either the gain-limited sensitivity or the noise-limited sensitivity. The second, a level of −50 dB (mW) or the maximum usable input signal level, and the third, the intermediate signal level.

The following measurements are carried out for each of these three input levels. The television signal to which the receiver is tuned has a 50 percent level grey pedestal as picture modulation. The signal generators are tuned to the frequencies of interest with such a relationship that any signal generated by intermodulation shall be off-set from the vision carrier frequency of the wanted signal between 1 and 2 MHz in the direction of sound carrier of the wanted signal. The level of the signal generators is increased until an output voltage of the resulting signal between the modulation product derived from the cw signal generators and the vision carrier of the wanted signal is 12 dB, unless otherwise specified, below the standard video output voltage at the picture tube electrodes. If it is not possible to obtain an output voltage 12 dB below the standard video output voltage, measurements may be carried out at a different level of output voltage to be stated with the results The frequencies to which the cw signal generators are set are those that will give rise directly or from their harmonics to an interfering signal in the channel to which the television receiver is tuned. The particular frequencies selected may depend upon local conditions but frequencies shall be avoided when the measurement process is affected by other signals. These may result from receiver selectivity, spurious responses or components of the video signal such as harmonics of the horizontal scanning frequency. The frequencies used to generate the interfering signal shall be those used for television and VHF sound radio broadcasting and mobile communications transmissions in the area for which the receiver is intended.

Where available a spectrum analyzer may be used to simplify the measuring process.

9.3 Presentation of Results — Values for the level of the pair of interfering signals applied to the receiver to obtain intermodulation products having a voltage 12 dB below the standard video output voltage are tabulated for all measurement frequencies and television input signal levels. Due allowance shall be made in the results when measurements are made of intermodulation product levels other than 12 dB below the standard video output voltage.

10. FREQUENCY DOUBLING SPECIAL TEST FOR RECEIVERS USING MULTIPLICATIVE INTERMEDIATE FREQUENCY DEMODULATION

10.1 Definition — Although the generation of even order harmonics of the modulation frequency may occur in most intermediate frequency systems, frequency doubling has a special significance in i.f. sections using multiplicative demodulation. When the carrier channel contains a sideband corresponding to a component of the modulation frequencies that is not eliminated by the filtering or limiting action, multiplication occurs giving rise to a spurious double frequency component in the passband output.

10.2 Method of Measurement — Measurement is carried out on a representative range of channels in which the receiver is designed to operate. The receiver shall be tuned in accordance with 2 of IS : 4545 (Part 2)-1983* and the method used stated in the results. The radio-frequency signal is applied to the input terminals of the receiver through a vestigial sideband filter as required by the standards of the television system and a suitable matching network. The input signal level is adjusted to be between those level defined in 37 and 47 of Part 5 of this standard and in such a way that noise effects do not influence measurement.

The sound carrier is removed and the radio-frequency carrier is modulated with a video signal having sinewave picture modulation in the range from approximately 100 kHz upwards, adjustable to swing over the following ranges:

a) black level to white level,

b) 25 percent to 75 percent picture modulation, and

c) 40 percent to 60 percent picture modulation (*see* Fig. 3).

A selective voltmeter or spectrum analyzer is connected to a suitable point following the intermediate frequecy video detector to observe the demodulated signal. The sinewave modulation is varied in steps from a frequency of approximately 100 kHz to a frequency higher than the difference between the sound and vision carrier frequencies.

At each frequency the ratio of the wanted modulation sinewave signal and any generated second harmonic is measured. Particular care shall be taken to carry out measurements in the vicinity of modulation frequencies of half the difference frequency between sound and vision carriers.

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*Methods of measurement on receivers for television broadcast transmissions: Part 1 General considerations (*first revision*).
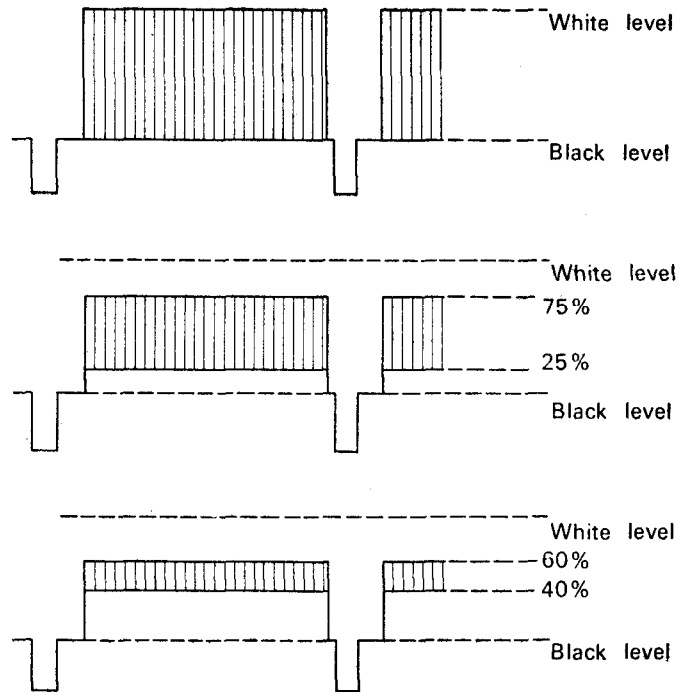
FIG. 3   VIDEO SIGNAL WAVEFORM FOR LUMINANCE CHANNEL
FREQUENCY RESPONSE MEASUREMENT WITH SINE-WAVE
OR SWEPT FREQUENCY PICTURE MODULATION

10.3 Presentation of Results — The results are presented by plotting the difference in level between the modulation frequency and the generated harmonics in decibels as a function of the modulation frequency, indicating specifically the frequency corresponding to half the difference between sound and vision carriers.

## 11. UNBALANCE RATIO OF THE BALANCED RECEIVER INPUT

11.1 The unbalance ratio is determined by measuring the available power of an asymmetrical signal that produces a specified value of output signal and the available power of a normal balanced signal that produces the same value of

signal output, the ratio between the two values of available power being expressed in decibels.

Care shall be taken that the measurement is not influenced by the effects of an AGC system or a limiting device.

The asymmetrical signal shall be applied through a resistive network to the radio-frequency input terminal device of the receiver as shown in Fig. 4.

The configuration of this network is based on the assumption that the input impedance for the asymmetric mode is very high as compared to the value of R_{un} and is not necessarily applicable if this condition is not met. The value of R_{un} in
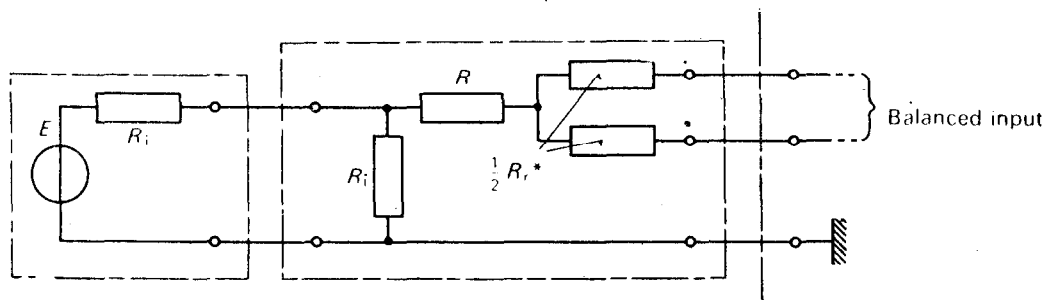
*These resistors shall be equal to within ±1 percent.

$$R = R_{as} - \tfrac{1}{2} R_1$$
$$R = R_{un} - \tfrac{1}{2} R_1$$

FIG. 4   CIRCUIT ARRANGEMENTS FOR APPLYING AN ASYMMETRICAL SIGNAL
TO A RECEIVER WITH A BALANCED RADIO-FREQUENCY INPUT TERMINALS

practice depends upon the installation, but a value of 600 Ω is representative of this parameter. Both signals shall be applied, and the necessary available power calculated.

Note — The accuracy of the method of measurement is limited, particularly at the higher frequencies used for television and care must be taken in interpreting the results.

12. MAINS INTERFERENCE SUPPRESSION RATIO

12.1 Definition — The mains interference suppression ratio is a figure representing the ability of the receiver to reject undesired signals entering the receiver by the mains connection.

12.2 Sources of interference may inject currents into the mains, which may couple into the radio-frequency circuits. These currents will be predominantly of the unbalanced types as described in **11.1**. The considerations concerning characteristic impedances and equivalent voltage source are the same, the only difference being that the values of the characteristic impedances of the mains are lower. The equivalent mains network average values are $R_{b1} = 150$ ohms and $R_{un} = 150$ ohms.

12.3 Method of Measurement — The measurement shall be carried out both at the signal frequency and at the intermediate frequency, the

resulting figures being called the RF and IF mains interference suppression ratio respectively. An asymmetrical signal 50 percent sine-wave amplitude modulated at 1 000 Hz, shall be applied through a resistive network so that the output impedance $R_1 = 112\cdot5$ ohms and through two resistances equal to 75 ohms and two capacitors to each of the two mains wires, as near as possible to the point where the mains lead enters the receiver. The outer conductor of the coaxial cable used for this purpose shall be connected for radio-frequencies to the receiver ground connection very near to the place where the mains lead enters (see Fig. 5). The mains voltage shall be applied through the network shown in Fig. 5.

The signal generator shall be tuned for maximum response of the receiver and adjusted to obtain an output voltage of 12 dB below standard video output voltage. The available power $\frac{E^2}{4R_1}$ at point A shall be determined.

The signal generator shall than be connected to the aerial terminals in the normal manner and the signal level at the vision carrier frequency required to obtain an output voltage of 12 dB below standard video output voltage shall be measured. The ratio of the two levels, expressed in dB, shall be recorded.
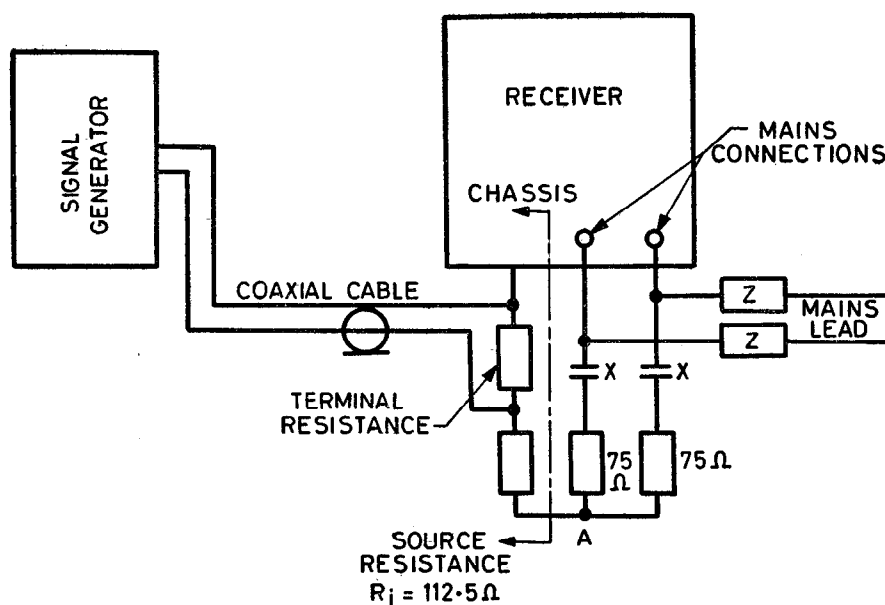
For all measuring frequency $Z > 1\ 000\ \Omega\ X < 10\ \Omega$

FIG. 5 CIRCUIT ARRANGEMENT FOR MEASUREMENT OF MAINS INTERFERENCE SUPPRESSION RATIO

ISI INDIAN STANDARDS INSTITUTION

Headquarters:
Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002
Telephones : 331 01 31, 331 13 75

Telegrams: Manaksanstha
(Common to all offices)

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